The Effects of Land Use Right Transaction Approaches on Residential Property Price – A Case Study of Beijing, China

A Thesis Presented to the Faculty of Architecture and Planning
COLUMBIA UNIVERSITY

In Partial Fulfillment
of the Requirements for the Degree
Master of Science in Urban Planning

by

Wenting Pang

May 2012

Abstract

Ever since China has carried out the Land Use Right Tendering, Auction and Listing Policy (Zhao, Pai, Gua) in 2002, controversies on whether competitions introduced by the new policy would lead to rapid increase in land transaction price has never stopped, along with concerns that higher land price would in turn be an incentive of increasing housing price. In this paper, the effects of land use right transaction approaches are tested through Hedonic Pricing model based on residential land use right price, property price and other influential factors such as accessibility, environment and location of main urban areas in Beijing. Results show a slightly correlation between transaction approaches and residential land use right price while a significant relationship between previous residential housing price and land use right price.

Keywords: Land use right, Land ownership, Transaction price, Housing price

Contents

1. Introduction

1.1. The Introduction of land use right trading system

Land and land use right ownership have long been a heated issue evolving a lot of discussions in China. It was not until 1978, when the Opening and Reforming Policy was carried out indicating that China started to transform from a planned economy to a market economy, did the notion of treating land use right as a commodity and allocating it from the perspective of market started to germinate. In 1988, the Amendment of Constitution was carried out stating that the land use right can be transferred according to certain legal regulations and approval. Since then, land resources become tradable based on protocols, agreements or negotiations. Once an agreement was reached, there was not any charge of land acquisition except for land convince fee which was rather low compared to the land value, nor was there any regulations on the length of using tenure. According to this policy, land use right owners were able to trade with developers by themselves and acquire great profits from real estate development without paying extra payments to the government. Thus though the policy improved land utilization efficiency in some ways, land resources were largely undervalued due to low transaction cost and problems such as corruption caused by opacity started to occur.

In order to recapture land value and improve transparency of land use right market, a new policy on land use right administration – the Regulation of Tendering, Auction and Listing of State-owned Land Use Right Transferring (Ministry of Land and Resources No.11 Regulation: Zhao biao, gua pai, pai mai chu rang guo you tu di shi yong quan gui ding) was carried out by the Chinese government in 2002. However, though this policy symbolized that land use right transaction approach was transited from negotiation-based to a market-based land transaction system, it was not put forward as an obligation. So both negotiation-based and market-based transaction approaches had existed in Chinese land use right management process for 2 years. This dual management system was finally put into an end in March 2004 when the No.79 Regulation of Ministry of Land and Resources stipulated that all commercial used land must be transferred by open biddings (tendering, auction and listing) after August 31st. Thus, from then on, negotiation-based transaction finally became a history.

Compared with negotiation-based transaction approach, the new Land Use Right Tendering, Auction and Listing policy introduced competition into land use right market thus make the transaction process more transparent, open and fair. Though all these three approaches are market-based, there are still differences between each of them (Table 1, Figure 1).

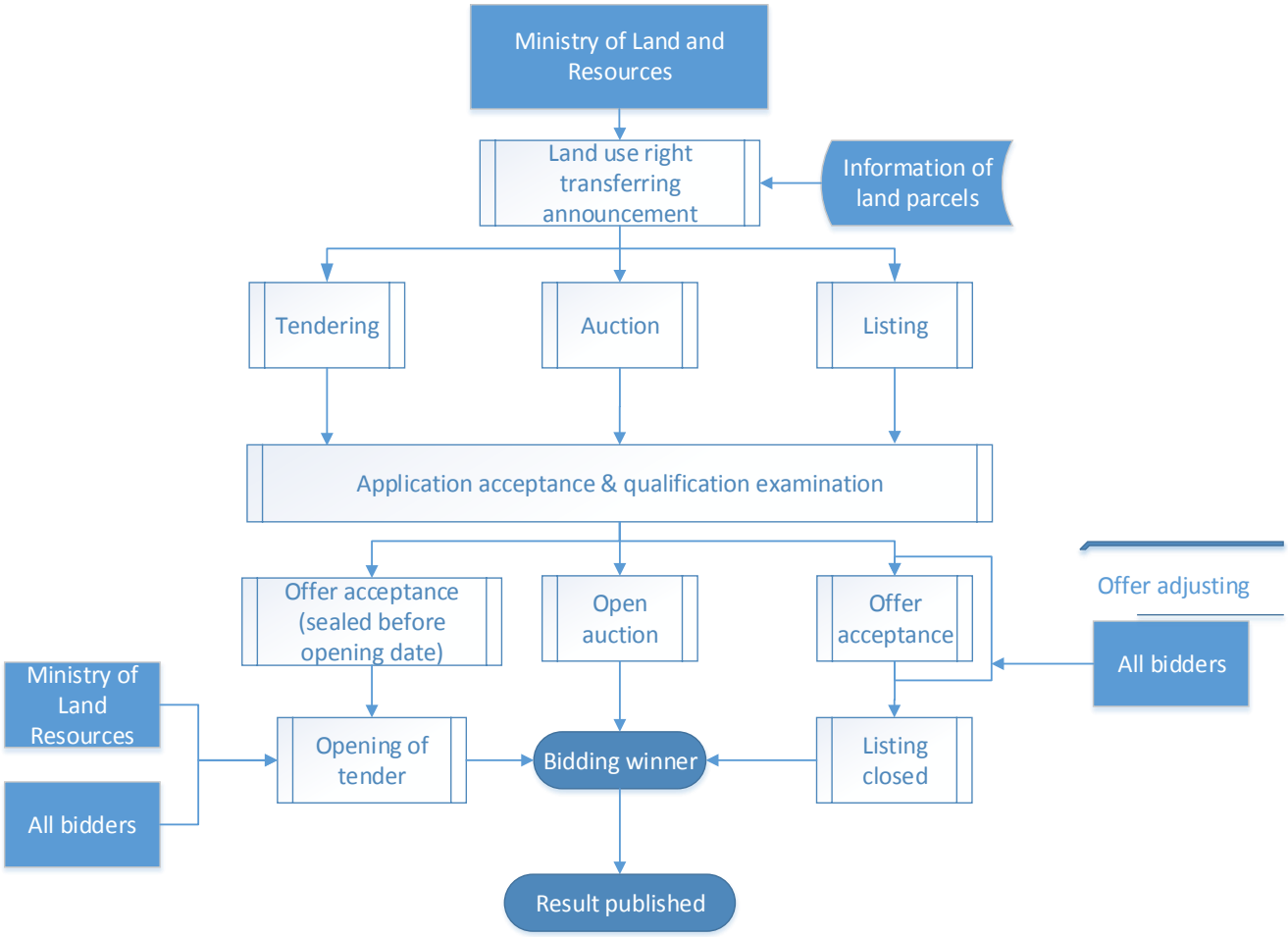


Figure 1 Transaction process of tendering, auction and listing

Table 1 Comparison of tendering, auction and listing

	Tendering	**Auction**	**Listing**
Floor price opened to the public	No	No	Yes
Floor price setter	Related committee	Related committee	Transferor
Way of quoting	Submitting bidding documents	Bidding at scene	Submitting application
Number of quoting	Only once	More than once	More than once
Minimum number of bidders	2	2	1
Selection of winner	Highest price or according to other considerations before due date	Highest price	Highest price

Land use right listing refers to the procedure that the land use right transferring announcement including location of land parcel, area, planned land use type, tenure and the incremental amount of price per offer is posted to the public by the Ministry of Land and Resources of municipal government. The opening price, which is the lowest price is set by the transferor or the previous land use right owner, and the transferring price is kept upgraded according to the offer made by perspective buyers till the due time. Before the transaction is closed, developers participating the transferring are able to offer multiple times according to the current price and their own considerations. The winner will be the developer who offers the highest price before the due time. A transferring will be cancelled if no offer is provided or the highest price is still lower than the opening floor price.

Tendering announcement is also published by the Ministry of Land and Resources of municipal government. There should be at least two bidders taking part in the transaction process, otherwise, the transaction will be cancelled. At the beginning of a process, bidders should hand in bidding documents and all the documents will be sealed and collected before due date. All the bidding documents will be reviewed by a committee according to evaluation principles and urban development strategies. Factors such as offering price, developers' experience, credits and reputations are usually taken into consideration during the evaluation process so as to avoid insufficient subsequent investment capital or ineffective land development patterns. The floor price is determined by the Ministry of Land and Resources before a bidding starts, though the price will not be opened to the public.

Auction for each transaction will be held only once and the whole process is opened to the public, developers who offer the highest price in an auction will be the owner of land use right. Similar with tendering, the floor price set by the government will not be provided to the public.

According to the descriptions above, these three market-based approaches have their own characteristics. Auction is the one with the highest transparence since its whole process is opened to the public. Tendering depends more on government intervene for the selection standard of tendering winner contains not only price offered by them but also information such as bidders credits, capability of operating residential real estate projects, the amount of affordable housing provided and budget. While listing has the longest process duration so as to allow bidders to adjust their offers according to other competitors' decisions.

However, the reform still has its drawbacks. For instance, simply treating land as a capital and commodity overlooks its feature as a natural and public resource. If the government allocates land only based on auction result, it may fail to cater to public interests and thus arouse social problems, for example, in order to compensate the cost of purchasing land parcels, developers may reduce the amount of affordable housing or building more high-end residential projects. Moreover, due to the different process of tendering, auction and listing, different transaction forms might have different influence on land use right acquisition (Lei & Li, 2007). For example, auction is a complete competition that reflects the relationship of demand and supply. While the tendering winner of a certain land parcel is chosen by the tendering committee not only based on the price but the future development design, plan, and the developer's credit as well, i.e. some sort of social value of land.

Thus here raises the research question, whether and to what extent transaction approaches will influence transaction price. Moreover, since a parcel of land is not only related to physical features such as area, planned land use type, floor area ratio etc., but is defined by its location,

accessibility, surrounding conditions and level of housing price within its area as well, another question has been brought to table that whether land parcel transferring price is related to housing price or not.

Due to the differences within these three approaches and since most of the land parcels will be developed into residential housing, the hypothesis of this paper is that land use right transaction price is significantly influenced by transaction approaches and previous housing price in the same area.

1.2. Structure of the Paper

This paper tries to answer these questions by taking Beijing in China as an example. In section 1, an introduction is presented to show the differences between tendering, auction and listing and explains the reasons of selecting this research question. In section 2, background information on the transition on urban land resources and land use right management in China is provided so as to furnish readers a better understanding on reasons that generated the enactment of Regulation of Tendering, Auction and Listing of State-owned Land Use Right Transferring. Then section 3 reviews relative studies on the influential factors on residential property values, as well as the relationship between transaction types and housing price. Section 4 describes data and methodology that is used in this research including data summary, data processing and introduction of Hedonic Pricing model. The following section 5 is the empirical study that takes Beijing as an example. This section builds up economic model with Beijing land parcel transaction data from 2003 to 2013, analyzes coefficients of each influential factors and explores the mechanism and influence level of each transaction form and housing price as well. And according to the analysis and explanation of model results, section 6 provides conclusions with comments and recommendations on the new land use right policy and also makes suggestions for future research.

2. Background

According to the previous introduction, the evolution of urban land use right in China changes from free administrative allocation to negotiation-based transferring and finally transits to a tendering, auction and listing system, based on which, land use right for development has to be leased from the municipal government with land acquisition fees for a fixed period of time, instead of being assigned by the government without any cost or tenure. However, this policy change has not taken place overnight, on the contrary, it has taken China decades to gradually achieve its goal of land use right commoditization. And this arduous process has aroused numerous controversies, involved multiple stakeholders and brought about deep influence and changes to Chinese society, and the Chinese government is still devoted to adjusting its current policies so as to better adopt its current economic and social development condition.

The evolution and revolution of urban land use right in China has always been carried out in accord with the procedure of industrialization and the reform of the economic system of the country, and its way of evolution can be divided into four periods according to land use right allocation modes.

2.1. Free Administrative Allocation Period

Under the planned economy system time, before the Opening and Reform Policy was carried out in 1978, land resources in China were allocated via administrative allocation, without tenure limit and payment, nor could the land resources be transferred to others. This administrative

allocation method of land management brought great benefits to agencies, groups and institutions tightly related to the state or possessing the same rights of central-level government, such as military units, state-owned enterprises and factories. Since those sectors enjoyed the priority of being allocated not only large area land parcels, but advantages in choices of locations as well. And according to other studies, in the early 1980s, nearly 30 percent of the core area in Chinese cities was taken for industrial use and almost all were owned by state-owned enterprises or companies closely related to the state or municipal government (Ho & Lin, 2004).

Long before the first Land Management Law was issued, the ownership of urban land has been entitled to the state according to the People's Republic of China (PRC) Constitution in 1982, which has also stipulated that land in rural areas belongs to village collectives. Though the ownership of land has been given to the state according to the law, the term 'ownership' was rather vague since there was not any further regulation stating how the 'state' could benefit from its ownership towards the urban land, nor did the law identify what kind of agencies or stakeholders had the right to execute their right of land legitimately (You-tien Hsing, 2010).

It was not until 1986, when the Ministry of Land and Resources was officially established that the state start to manage its urban land resource from a horizontal and territorial perspective (You-tien Hsing, 2010). The first PRC Land Management Law, which was adopted in 1986, stipulated again the dual land categories and management in China. It says all the urban land should be owned by the state and land in rural areas should belong to village collectives. It also stated that it was illegal to transfer land use right to any other organizations, groups or individuals (PRC Land Management Law, article 2, 1986). Thus though the land resource was divided into two parts -- land resources and land use right. Being deprived of the feature of circulation, land resource was only the carrier and supporter of real estate development. Military units, state-owned enterprises and factories, and other institutions at the same level continued to seek more land without a standard expense.

2.2. Negotiation-based Allocation Period

The amendments of the PRC Constitution and the PRC Land Management Law adopted in 1988 changed the stipulation that 'no institutions or individuals should transfer land by either occupying, selling, leasing or any other means' to 'no institutions or individuals should transfer land by either occupying, selling, leasing or any other means, while land use right can be transferred under due process of law'. According to the amendments, land use right and land ownership right have been separated; the previous free or low-cost, non-circulating and non-tenure land use policy was replaced by a new one which communicates that land use right with a fixed tenure is able to be transferred legally in the land-lease market by negotiation, tender, listing or open auction, which commodifies land use right so as land use right owners are able to make profits through land transaction.

Actually, Shenzhen, one of China's city pioneers has already practiced the new strategy of separating land ownership and land use right in to different class since 1987, a year before the amendments were carried out. In 1987, the city traded land use right as a commodity and the land use rights of three land parcels were transferred by tendering and auction. However, though Shenzhen's success has inspired the land use right reform process greatly, most of the land use right transfers were still conducted based on negotiation.

The negotiation-based transaction has been the first or even the only choice of government land resource allocation for about 16 years from 1988 to 2004. However, though during the

transferring process, the municipal government exerted exclusive power towards the result of land allocation since all the land parcels should be transferred under the ownership of the municipal government before being transacted to developers, most of the profits still belonged to the developers who turned the 'raw land' into 'ripe land' that could be developed. Thus, on one hand, the municipal government was still unable to achieve fair benefit from land leasing. On the other, the process was continuously been challenged by the public due to its uncertainty and opacity. Though negotiation-based transferring was different from administrative allocation, it was still lack of openness and fairness and was largely depended on governments' determination which might be influenced and abused by stakeholders who had extensive relation with governments.

In 1994, the Urban Land Real Estate Management Law was carried out, regulating legally the types of land use that can be allocated through administrative assignment, such as land use for military, public facility, energy, transportation etc., the rest of types should be transferred with payment whose amount was estimated according to the law. And in 1998, the Amendment of PRC Land Management Law clarified from the perspective of legitimation for the first time that leasing, transferring and selling of land use right should be conducted under certain amount of payment. Thus land use right management policy was conducted both by administrative allocation and negotiation.

In April 2001, in order to strength the management of land resource, the State Council stipulated that except for land parcels zoned for country security purposes, all the other parcels should be opened to be public and also advocated local governments start to enact land use right biding and open auction policy. This announcement was regarded as the milestone which symbolized that land resource allocation in China entered the era of being determined by market rather than solely based on the decision of government.

2.3. Co-existence of Negotiation-based Allocation Period and Market-based Allocation

Later in 2002, the Ministry of Land and Resources enacted the Regulation of Tendering, Auction and Listing of Stated-owned Land Use Right Transferring, which defined that the transferring of land use right for commercial, tourism, entertainment and commercial residential must be conducted through either tenure, auction, or listing process. It also clarified the regime and procedure of negotiation-based transferring, emphasizing that negotiation must also be conducted under market competition mechanism.

2.4. Market-based Allocation Only

Though being regulated, it was not until 2004, when the Ministry of Land and Resources carried out the stipulation that all the land parcels that are zoned for commercial, industrial and residential use must be transferred through the process of tendering, auction and listing after 31st August, was the method of negotiation replaced. Thus, instead of direct intervention, the value of land is reflected according to the market, which increases the efficiency of land usage and also contributes to the establishment of a healthy and fair land transaction market.

When it comes to land use types, different types of land should be treated differently. For example, government usually tries to keep the price of industrial land at a lower level so as to attract investments and industries. While residential land usually reflects the demand and supply of the real estate market. Thus this study uses residential land use right transaction data so as to reduce the influence of government intervention as much as possible.

3. Literature Review

3.1. The Determinants of Residential Land Price

3.1.1. Classification Method of Driving Factors

Land price and the changing of land price are always influenced by multi-factors, which might be different from time to time with the trends and development of the society and the economy. In order to investigate the driving forces of land price change, there are several ways of sorting factors. For example, Willkison divided driving forces into location factors and individual factors (Willkison, 1973); and some scholars classified those factors into three groups – regular factors, regional factors and individual factors (Yan & Lin, 1993; Li, 2013). While other studies investigated from social, economic, political and environmental perspectives (Denise & William, 1996).

Moreover, Zhou in 2004 used macro-factors and micro-factors as classifications. According to the research, macro-factors referred to factors that exerted influences on the land price of a region or an urban area as a whole, such as policy, GDP, economic status etc. While micro-factors was defined as factors that affects individual parcel's price, such as location, land use type, area, shape, topography etc. (Zhou, 2004).

3.1.2. Effects of Socio-economic Factors on Land Price

Besides analyzing influential factors in a general perspective, many studies have zoomed in to concentrate on the relationship between land price and a certain factor. For example, Capozza and Helsley divided urban land into four components – 'the cost of conversion, the value of accessibility, the value of agricultural land rent and the value of expected future rent increases.' According to their research, city development driven by population growth was the dominant factor affecting land price (Capozza & Helsley, 1989). Capozza and Helsley's conclusion can also be used in China, by building panel data model on residential land price for 27 large and middle cities, Hu also concluded that population size was one of the most influential factors (Hu, 2007).

Similar with Hu, Ke and He conducted quantitative analysis for Chinese market and found that land price was not only influenced by population but income as well and the study also indicated that the vigorous demand was the major driving force of increasing land price (Ke & He, 2008). Based on the analysis that the formation of urban land price and rent, effective purchasing power will determine the overall urban land price. Peng and Chen found that other reasons such as increasing population and investment also contributes to the land price increase (Peng & Chen, 2005). Also, price uncertainty influences land price by extending development timing (Christopher, 2005).

In 2010, Song and other scholars conducted hierarchical linear models to measure the level of influence of 10 possible factors including population density, urban construction land area, real estate investment, new area for land transfer, arable land occupation tax, and new construction land use fee (Song, etc., 2010). According to their research, real estate investment is the first driving force of increasing land price and urban construction land area and the amount of investment in real estate market are the other two factors that were most influential.

3.2. Land Use Right Price and Land Policy in China

Besides affected by characteristics of land itself and other external factors such as geographic

location, surrounding environment, economic level and income per capita, land price is also largely tied to policy and development strategies such as the macroeconomic regulation policy of land, financial and monetary policy and tax policy (Wang, 2007).

Policies carried out by the Chinese governments have always kept playing an important role in bringing transition and evolution to land and land use right administration. Therefore, statements and policies carried out by both central and local government are the main forces that drive the change of land price (Tang, 2005), which is also proved by Ke and He with Robust equation that government conducts both direct and indirect influences on urban plan price. There is significant variance on land price under different transaction forms (Ke and He, 2008).

What is more, the impacts of government administration and regulation on land price not only exist in primary market, but also reach out to secondary market. Since land is state-owned, thus in primary market, land price is highly related to the relationship between demand and supply. While in secondary market, the major influential factors are the discount rate and willingness to pay of developers, which are deeply affected by regulation and land policy such as tendering, auction and listing system (Zhou & Lv, 2008). Similar with Zhou and Lv's study, Yang also analyzed government behaviors from the perspectives of primary and secondary market indicating that though auction is a process operated based on market mechanism, government is the stakeholder who has the right to decide the transaction form.

Due to the scarcity of land resource, the government might still prefer the rest two forms instead of auction. Thus the new system is not as fully competitive as many people wish (Yang & Liu, 2000). Yang's conclusion is supported by the evidence from succeeding study by Zhao that from 2003 to 2011, the percentage of transactions via listing was 84.1%, while auction was only 2.5% (Zhao, 2012). Some scholars figure out that this was because listing process provides plenty of time for bidders to consider and make decision more rationally (Li & Hu, 2003).

4. Data and Methodology

4.1. Assumptions of the Study

Under similar physical, locational features and surrounding environment, there are significant differences between different transaction modes and the price of land use right is impacted by the previous housing price in the same area.

4.2. Research Design

In order to investigate the relationship of land price, transaction method and housing price, Hedonic pricing method will be applied via an OLS analysis based on data processed by GIS. By using GIS-based analysis, the impact of spatial influence will be taken into account and the visualization of regression result is able to provide more intuitive understanding of the differences caused by different transaction forms.

Hedonic pricing model is often conducted to evaluate the economic value of real estate pricing, which is based on the notion that price of a good is influenced by its different characteristics. The influential factors can be divided into three categories:

a) Physical features

   The interior features of a land parcel, such as price, area, planned land use type, etc.

b) Locational features

   The location and commuting conditions of a land parcel, such as transit accessibility,

distance to CBD/commercial area/city center, etc.

c) Surrounding features

The exterior elements of a land parcel, the environment and neighborhood conditions of a certain parcel, such as level of access to public facilities and infrastructures, crime rate, number of parks within walking distance, etc.

The definition of Hedonic model is as follows:

$$\text{LPrice} = f(P, L, S) \quad \ldots\ldots (1)$$

In equation (1), variable P refers to physical factors of a land parcel, L stands for locational features and S stands for surrounding features.

According to the result of OLS coefficients, an equation of land price measured by multiple factors will be established. In the equation, different factors will have different coefficient values. Thus the bigger the coefficient is, the larger the influence of a factor will be. With the equation, the most influential factor can be determined.

4.3. Data Sources and Data Collection

This research is conducted with land use right transferring data and real estate market data in Beijing, China.

Data collected and used are shown in Table 2. In the table, 'Document' refers to data provided by government official documents; 'Website' refers to data that is collected from the website of real estate companies or real estate information companies such as Sohu Housing and Sofun Web; 'Process' refers to secondary data that is extracted from GIS spatial data.

Table 2 Data Source Matrix

Data		***Source***		
		Document	**Website**	**Process**
Non-spatial data				
Land parcel information				
	Transaction Price	**X**		
	Land parcel area	**X**		
	Construction area	**X**		
	Location	**X**		
	Planned usage	**X**		
	Floor area ratio	**X**		
	Planned land use type	**X**		
	Ownership	**X**		
	Parcel type	**X**		
	Development status	**X**		
Housing price			**X**	
Housing price index			**X**	
Land price index			**X**	
GIS data				
	Distance from each parcel to public transportation			**X**
	Distance to city center			**X**

	Distance to public facilities			**X**
	Beijing road network		**X**	
	Beijing subway/bus station		**X**	
	Beijing city boundary		**X**	
	Parks and open space of Beijing		**X**	

Data of land parcel information in Table 2 is acquired from the official website of Beijing Ministry of Land and Resources. According to the Standard of Urban Land Use Categories, there are eight main land use types of urban land in China – residential, administration and public services, commercial and business facilities, industrial, logistics and warehouse, street and transportation, municipal utilities and green space. Instead of being zoned as single-use, most of the urban land is planned for mixed use such as residential and commercial, residential and public facilities, etc. In this study, only data planned for residential use or mixed use that contains residential functions will be collected and introduced build the model and data that meets the criteria will be divided into two groups – single used and mixed used.

5. Case Demonstration

5.1. Study area

This research takes Beijing as an empirical case. Beijing, as the capital city of China, has long been regarded as the center of economy, politics and culture of the country. As shown in Figure 2, Beijing consists 14 administrative districts and 2 counties and has been divided into four functional areas (Figure 2.).

a) Capital city core area

The core area contains Dongcheng district and Xicheng district, which is the cardinal area combining both ancient and modern features of the city, function as the political, cultural and global communication center.

b) Urban function area

Urban function area includes districts of Chaoyang, Haidian, Fengtai and Shijingshan with the duty of practicing main urban functions, provides main economic services both domestically and globally.

c) Urban development area

This area is consisted with Tongzhou, Shunyi, Daxing, Changping and Fangshan districts. Functioning as the main area of manufacture and modern agriculture of Beijing, and reducing the industry and population pressure of core area as well, this area is regarded as the future economic development area and growth pole of Beijing.

d) Ecological conservation area

This area contains Mentougou, Pinggu, Huairou, Miyun and Yanqing, which provides ecological protection and resources to Beijing.

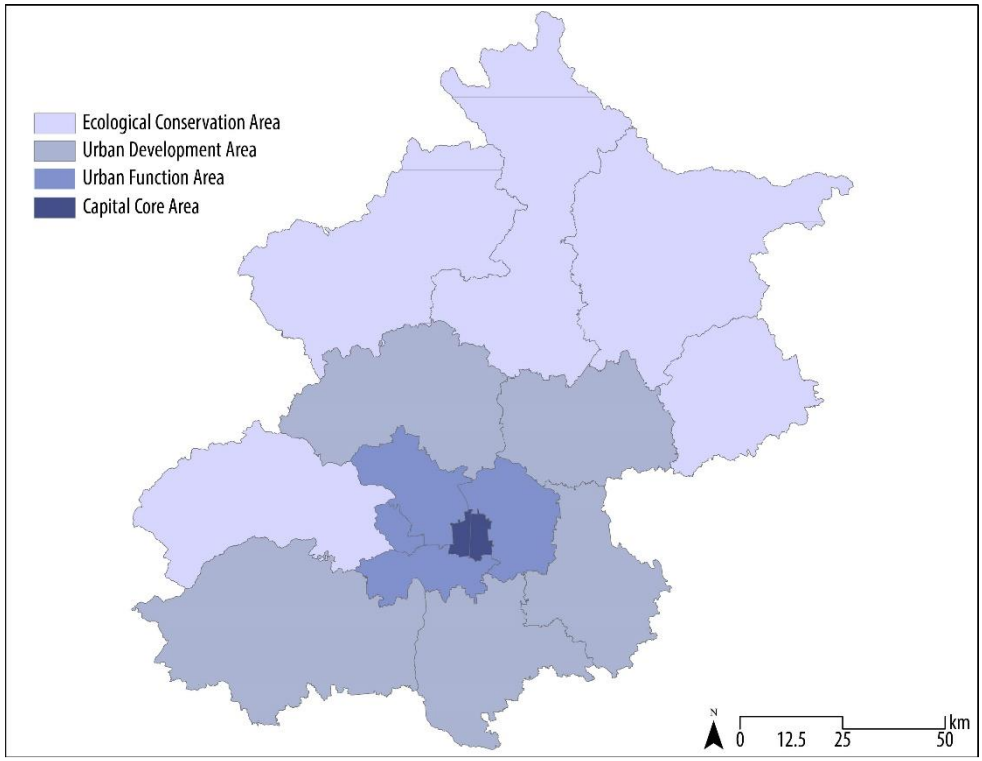


Figure 2. Functional areas of Beijing

This paper only focus on land parcels within the Capital City Core area and Urban Function area since most of the urban activities are taking place in these two areas and residents living within these two areas are the main users of the 'Ring' roads and public transportations of Beijing. The term main urban area in this paper is defined as areas of Beijing's six main districts: Haidain, Xicheng, Dongcheng, Chaoyang, Fengtai and Shijingshan (Figure 3.). According to Figure 3. , the smaller map on the bottom left shows the whole administrative boundary of Beijing while the bigger one shows only the six districts in the main urban area.

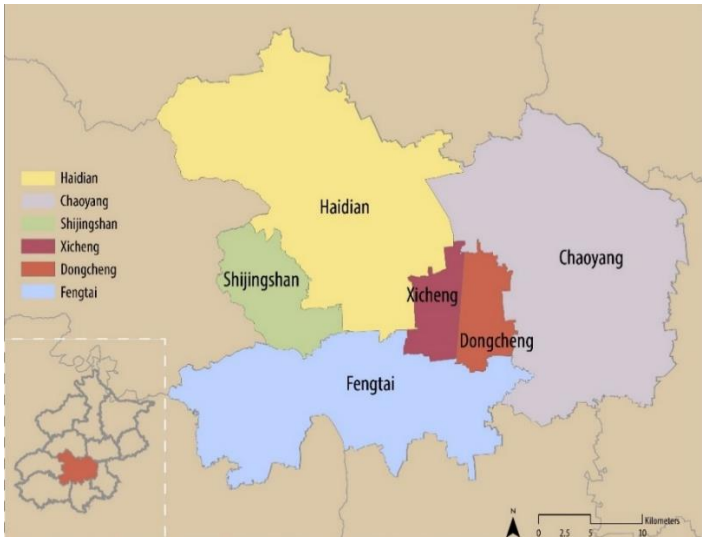


Figure 3. Administrative Division of Beijing, China

Embracing multiple roles, Beijing keeps sprawling ever since the People's Republic of China has

been established in October, 1949 and the speed of urbanization and industrialization increased dramatically after 1978 when the Reform and Opening Policy was carried out, as one of the largest cities with ample opportunities and highly extent of involvement to the world, Beijing has never failed to attract human resources, migrants and economic investments.

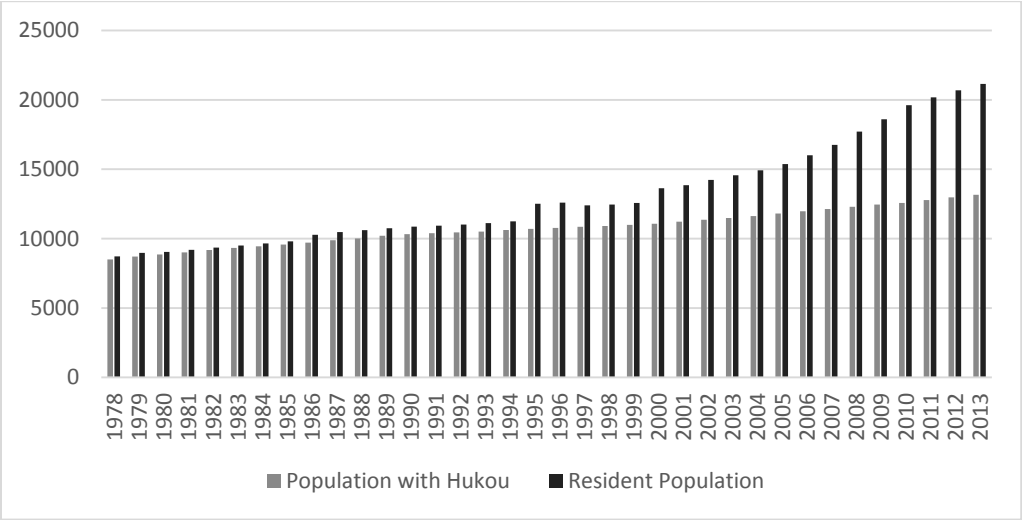


Figure 4. Beijing Population Changes 1978-2013 (unit: thousand people) (Data source: Beijing Census Bureau)

Figure 4 shows Beijing population change through years from 1978 to 2013. Resident population refers to population living in Beijing no shorter than half a year while population with Hukou represents registered permanent residents of Beijing. According to the figure, population with Hukou increases gradually through the years compared with resident population which increases dramatically after 1995. Based on the statistic data from Beijing Census Bureau, in the end of 2013, the total resident population of Beijing is 21,145,000 and among these people, 10.5% of them are living in the Capital core area, 48.8% of them are living in the Urban function area, 31.7% in Urban development area and the rest of 9% living in the Ecological conservation area. Thus the majority of residents in Beijing are living in areas within the 5th Ring Road.

5.2. Land Use Right Market and Housing Market in Beijing

In order to measure the land use right price change in terms of time, Land Price Index (LPI) is introduced.

$$\text{LPI} = \frac{P_i}{P_0} \times 100\% \quad \ldots\ldots (2)$$

P_i represents the land use right price of the current year, P_0 is the land use price of base year. Thus the greater the LPI is, the larger the change will be between years, which indicates greater fluctuation in social economy. Figure 5 below shows Beijing LPI changes from 2000 to 2013 calculated based on year 2013.

The Land Use Right Tendering, Auction and Bidding Policy was firstly adopted in 2003 in Beijing, however, though enacted, only 30% of the urban land was transferred based on this new policy. It was not until 2004, had the government taken measures to perform the policy speculating that all the commercial residential urban land use right should be transferring through tendering, auction or bidding process.

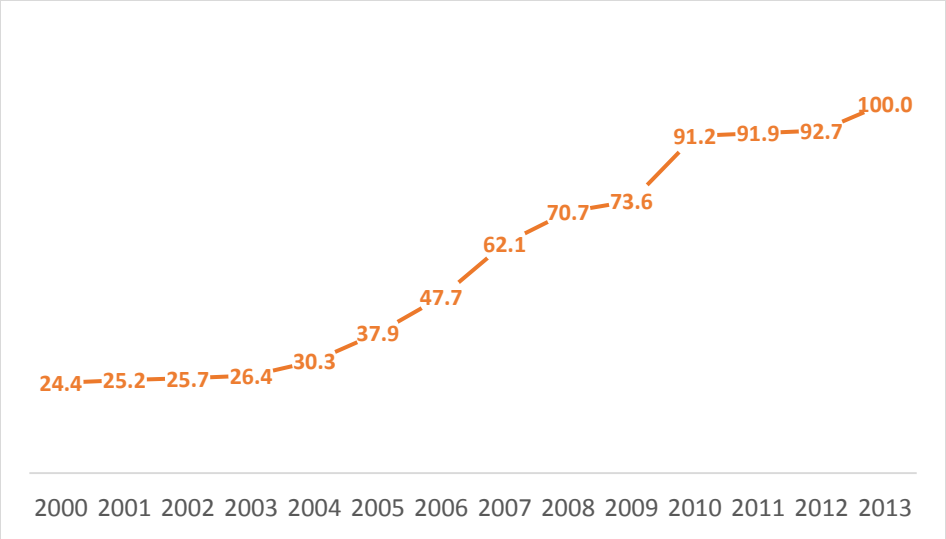


Figure 5 Beijing Land Price Index calculated based on year 2013 （LPI of 2013 = 100）
(Data source: China Urban Land Price Dynamic Monitor)

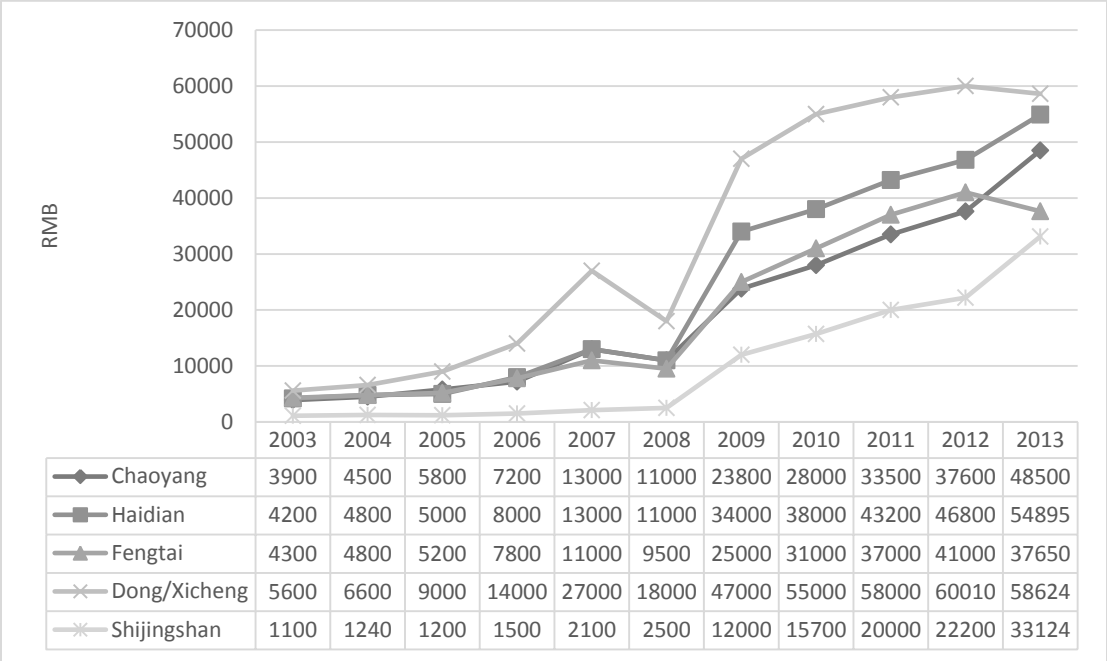
As what has been shown on Figure 5, land price keeps increasing over the years from 2000 to 2013 and experienced a rapid change from 2009 to 2010, which was supported by the evidence that in the year of 2009, many transactions were conducted with price 200% higher than the stating land price quote. And the increasing speed was slowed down after 2010, which mainly because of the policy modification. Before 2010, price was the only standard that was used to select the winner of tendering, while after 2010, several newly policies has been carried out:

a). 'competing on land price based on housing price roof set by the government', meaning that the government sets the housing price roof for a certain land parcel, developers who find the price set acceptable will bid for land use right price and the one who offers the highest price will be the winner of bidding;

b). 'competing on affordable housing area based on land use right price standard set by the government', meaning that the government sets price standard for a certain land parcel. All the developers offering price higher than the standard are eligible to enter the bidding in the next stage. During the next stage, developers compete for the maximum area of affordable housing they can provide and the winner will be the one who offers the largest area.

The trajectory of housing price change from 2003 to 2013 has been shown on Figure 6. Housing price in Beijing has increased more than 10 times over the years. There is a significant decrease in 2008 in all the districts except Shijingshan district, which might due to the government intervene from macroeconomic perspective that monetary tightening policy has been enacted, and also the Housing Purchasing Constraint policy regulating that the mortgage interest rate for purchasing the second house in Beijing would be increased by about 20%. After the drop, in 2009, housing price skyscraped more than 3 times as in 2008, according to the analysis conducted by Chinese Industry Research Network, the second-hand housing market played an important role in pulling the price up, which is proved by the fact that the average number of second-hand housing transactions in February 2009 is 9,373 while the number of newly built residential housing is 5,865 (ChinaIRN, 2009).

Housing price in Capital Core Area (Dongcheng, Xicheng) has been the highest through the years. Haidian district ranks as the second highest which may because of the large number of schools that attracts families with children attending to schools purchasing houses in the district. Housing price in Shijingshan district has been the lowest among the five administrative districts, mainly due to its location that is away from city center and lack of facilities and public education access.



	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
Chaoyang	3900	4500	5800	7200	13000	11000	23800	28000	33500	37600	48500
Haidian	4200	4800	5000	8000	13000	11000	34000	38000	43200	46800	54895
Fengtai	4300	4800	5200	7800	11000	9500	25000	31000	37000	41000	37650
Dong/Xicheng	5600	6600	9000	14000	27000	18000	47000	55000	58000	60010	58624
Shijingshan	1100	1240	1200	1500	2100	2500	12000	15700	20000	22200	33124

Figure 6 Average Housing Price Change in Beijing (unit: RMB/sqm) (Data sources: www. soufun.com)

5.3. Data Statistic Description

5.3.1. Land Use Right Transaction Data

As mentioned before, only transactions happened in areas within the 5th Ring Road with the planned land use type as residential use will be taken into account. And land transaction records met the above requirements are divided into different groups based on transferring method – listing, bidding and open auction. Moreover, based on planned use type, data is divided into two groups – mixed used and residential only.

According to the data from the Beijing Ministry of Land and Resources (Table 3), from the beginning of 2003 to September, 2013, the total number of transactions is 7,366. Among these transactions, 4,750 out of 7,366 were taken place within the main city area, while 861 of them are functioning as residential use or mixed use with residential land use type. The distribution of land parcels is: 77 in Haidian District, 373 in Chaoyang District, 7 in Shijingshan District, 111 in Xincheng District, 173 in Dongcheng District and 105 in Fengtai District. Though already published via the official government website, 315 of them are still in the transferring process whose transaction price has not been decided yet.

Table 3 Statistics of Beijing land use right transaction records (2003 - 2013)

(Data sources: Ministry of Land and Resources of Beijing)

		Number of transaction records
Total in Beijing		7,366
Main urban area		4,750
Residential or residential mixed use		861
	Haidian	77
	Chaoyang	373
	Shijingshan	7
	Xicheng	111
	Dongcheng	173
	Fengtai	105

Figure 7 shows the distribution of land parcels and the contour based on transaction price. In the calculation, 2013 is set as the base year. According to the maps, the majority of land parcels transferred between 2003 and 2013 were planned for residential use only (Figure 7-b). The mixed use land parcels (Figure 7-a) were scattered relatively evenly in the Capital Core Area and Urban Function Area and based on the price contour, regions with higher transferring price are located in the north and east of the city mainly between the 3rd Ring Road and 5th Ring Road. While compared with mixed use land price contour, the most of land parcels only planned for residential use distribute in the Capital Core Area, especially in Dongcheng district. And regions with relatively higher transaction price are in the middle, south and southwest of Beijing.

According to the transaction time and price information from transaction records, the explanation to the distribution pattern of mixed use land parcels can be concluded as, most of the transfers with higher price happened after 2008; moreover, the economic development level of Chaoyang, Dongcheng, districts and the east and south of Haidian district is greater than other districts, thus, most of the newly commercial, residential and business programs were taken place in those regions. The lower price in Capital Core Area may due to the relative fully built-out condition and the difficulty of land acquisition in those areas.

When it comes to residential used only land parcels, regions with higher price shown by Figure 6-b are well supported by the reality that most of the residential projects after 2008 are undertaken in south and southwest of the city such as Fengtai district, southern part of Haidian and Chaoyang districts.

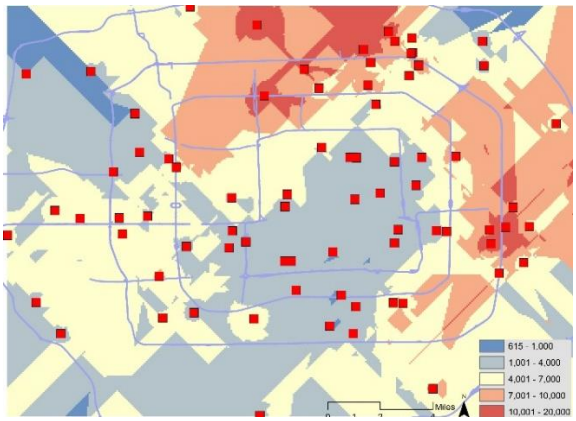


Figure 7-a Mixed Use Land Price Contour

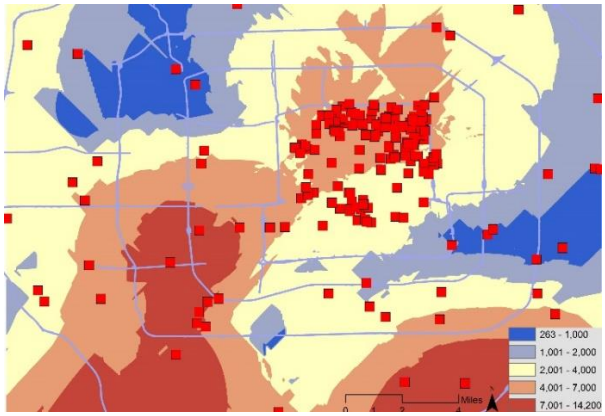


Figure 7-b Residential Only Land Price Contour

5.3.2. Data Process

In this paper, 2013 is regarded as the base year since all the spatial data used in this paper is from year 2007 and 2009. Land use right price of other years are all transferred to the scale of 2013 based on Equation 2. Due to the data constrain, only land parcels data with information on previous years housing price and transaction modes are taken into account. When processing data, I find that there are only 2 transactions that were conducted by open auction, thus auction mode is not introduced into the Hedonic model. The total number of records that can be utilized to the research is 146, among which 103 land parcels were transferred by listing and the other 43 were transferred by bidding process.

Spatial data is processed and extracted by ArcGIS 10.0 and the steps are as follows:

1) Define projection and coordinate system.

   In this paper, for Projected Coordinate System, I used WGS 1984 Transverse Mercator and Projection is Transverse Mercator.

2) Data rectification.

   After assigned project system, the street layer and the administrator layer did not match in the same location, so spatial adjustment method has been conducted to rectify data.

3) Land parcel data visualization.

   Create Shapefile data to input land parcel data based on location information and the attribute record of each data should include land use right transfer price and housing price as well (Figure 8).

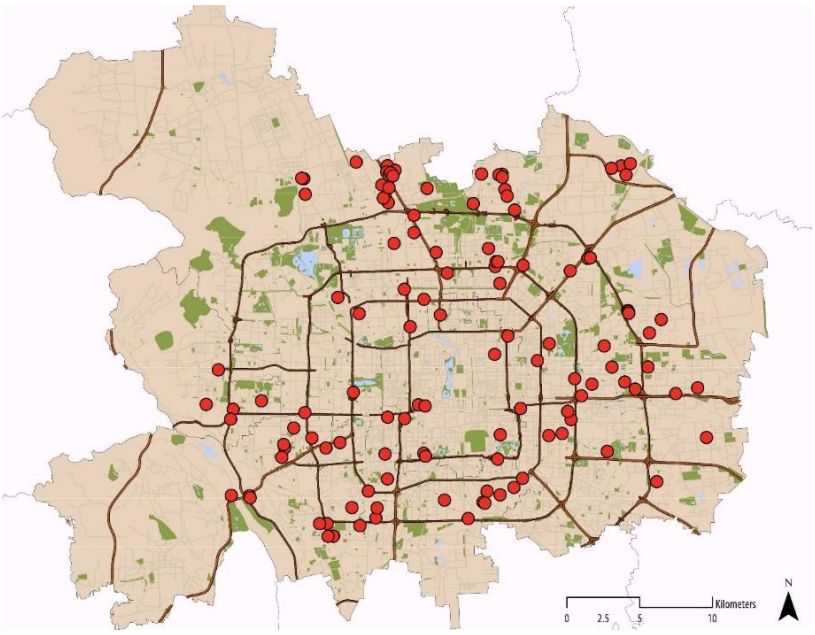


Figure 8 Land parcels data

5.4. Data Analysis

5.4.1. Model Description

Based on Equation $\text{LPrice} = f(P, L, S)$ ..... (1, equation for Hedonic Model in this case can be derived as follows:

$$\text{LnPrice} = \alpha LnP + \beta LnL + \gamma LnS + \text{C} \quad \text{..... (3)}$$

P refers to the physical factor, L refers to the location factor and S refers to the surrounding condition, C is constant.

The transaction price is the dependent variable. In order to avoid the influence of land area, the transaction price is measured by the amount of money per square meter. While the independent variables are physical factors, location factors and surround factors. In this research, physical factor contains land parcel area (TotalArea), planned construction area (PConsArea), FAR (the floor area ratio, it is used to measure the intensity of the development level of a site. Usually it is calculated by dividing building area by the lot size.), and housing price (Housingprice). Location factors are measured by distance to city center. Since Beijing is a mono centric city, so in this case, the location of Tiananmen Square is regarded as the center of city (DisttoTAM). The surrounding condition factors are measured by the level of access to public transportation, the amount of green space or open space, which are evaluated by distance to the nearest subway station (Disttosubway), distance to the nearest main road (Disttoringroad), the number of parks and green space (Count) within walking distance (800m).

The statistics of influential factors is shown in Table 4 **Data Statistics**.

Table 4 Data Statistics

Variable Name	Data Description	Minimum	Maximum	Mean	Std.
Physical Features					
TotalArea	Total land area	1,724.0	504,900.9	102,307.6	114,968.2
PConsArea	Planned construction area	3,600.0	712,184.9	153,035.5	143,047.5
Housingprice	Previous housing price	4,500.0	50,000.0	20,409.4	11,967.8
FAR	Floor area ratio	1.1	8.0	2.6	1.0
Locational Features					
DistoTAM	Distance to Tiananmen	2,958.8	20,499.0	11,592.2	4,830.3
Surrounding Features					
Count	Number of parks within walking distance	0.0	5.0	1.2	1.3
Distosubway	Distance to subway station	155.7	7,082.2	2,724.4	1,983.9
Distoringroad	Distance to ring road	42.3	4,621.5	999.7	968.6
Transaction Price					
TransactoinPrice	Land transaction price	281.2	63,350.3	12,765.8	11,038.2

Besides above factors, the model also includes two dummy variables: transaction method (listing and tendering) and planned land use type (residential only and mixed used). In order to introduce dummy variables into the model, Equation 3) is modified to

$$\text{LnPrice} = \alpha LnP + \beta LnL + \gamma LnS + \mathrm{C} + D_l + D_m + D_p \quad \text{..... (4)}$$

D_1 stands for planed land use type that contains two values – 0 refers to residential used only and 1 refers to mixed used land. D_m is transaction method that also contains two values – 0 refers to listing process and 1 refers to bidding process. D_p refers to whether there is open space within walking distance or not – 0 refers to not and 1 refers to yes.

5.4.2. Model Result

The Hedonic Model was calculated based on Ordinary Least Squares, and result of the model is shown in Table 5.

Table 5 Model Result

	Coefficients	T	Sig.
(Constant)	4697.032	2.616	0.023
Physical Factors			
TotalArea	0.087	2.019	0.058
PConsArea	-0.143	-2.486	0.029
FAR	-5.149(Elasticity)	-2.350	0.026
Housingprice	0.477(Elasticity)	7.73	0.000
Surrounding Factors			
Disttosubway	-0.070	3.331	0.009

Dummy Variable (insignificant, removed from the final equation)			
Planned land use type	0.068	0.632	0.457
Trasnaction approach	0.073	2.011	0.071
Existence of open space	0.021	0.445	0.128

According to Table 5, independent variables expect number of parks within walking distance, distance to Tiananmen Square and distance to Ring Roads can explain the changes of land price effectively. Variables of distance to Tiananmen Square, distance to Ring Roads and number of parks within walking distance have been removed from the model because their Sig. value is larger than 0.05 meaning that these variables are not able to make significant contribution to the dependent variable.

As it is shown in the coefficients table, the influence of transaction method, planned land use type and existence of open space is insignificant.

5.4.3. Result Analysis and Explanation

Reasons lead to this result may be that though Tiananmen Square is the geographic center of the city, it is not the most frequently travel destination of Beijing residents, on the contrary, it is rather a place for tourism. Moreover, though being a mono centric city, there are many mature sub-centers functioning as business, industry clusters and commercial zones that provide great number of jobs and choices to shopping, thus though located in the center of the city, Tiananmen does not serve as a main travel destination to the residents.

The reason why distance to Ring Road is insignificant may be that people's preferences of living distance toward Ring road is more like to be a curve that at first it increases and then it decreases since Ring Roads are different from local streets. Compared with local streets, on which the speed is usually limited under 40 km/h, the speed limitation on Ring Road is much higher than it on local streets. For example, the speed limitation on the 3rd Ring Road is 60 km/h, and increases to 80 km/h on the 4th and 5th Ring Road. Thus living near Ring Roads arouse problems such as noise, pollution and unsafety issues. However, people do hope to live within a distance that enables them to drive conveniently to the Ring road. Thus instead of the further the better, the distance preference increases at first and then decreases again.

The number of parks within walking distance (Count) from a certain parcel of land does not have significant correlation with land price. Moreover, the influence of the existence of parks is also insignificant, which may due to the data integrity that some of parks may have been built after the land was developed thus makes the model result insignificant.

In the category of physical factors, total area of land parcel (TotalArea) is positively related with land use right price meaning that the larger the parcel is, the higher the price will be, which is obvious in the reality. Planned construction area (PConsArea) is negatively related to land use price, indicating that there is a decrease of profit along with an increasing development scale. Thus, instead of developing supersized lots, it is more profitable to divide the land into different parcels, which is matched with the reality that Beijing Ministry of Land and Resources has already taken actions to carry out policy to regulate the scale of a single lot. FAR is also negatively related to land price, showing that land planned for lower density residential use is more likely to be transferred at a higher price. The possible reason may be that when building height is increased, the expense of construction and the investment in providing facilities such as

stairs, elevators will increase as well. So high residential density does not lead to high investment return (Bruceckner J K., 1987). Housing price has the strongest correlation with land use right price according to the result, proved by the level of significance and the value of coefficients. Though it cannot be concluded from the model that there is a causality relationship between land transferring price and housing price, housing price does exert influence on land transferring rights.

From the perspective of surrounding factors, distance to the nearest subway station (Disttosubway) has a negatively correlation with land transferring price, representing that the further a land parcel is away from public transportation such as subway station, the lower the price will be. The coefficient value of the factor is –0.071, which means that for every 1km closer to the subway station, developers are willing to pay 7.1% extra amount of money on the parcel. Though it seems that the preference of location selection of a land parcel tends to be impacted by its level of access to open spaces and parks, according to the model, this notion is not well supported by the result.

The insignificance of planned land use type indicates that though differs in land use type and development strategies, mixed used land and single residential used land affect little on developers' decisions which may because that the whole real estate market including residential, commercial and business is high-profitable and overheated now in China.

Besides land use type, it can be concluded that neither is land use right price influenced significantly by transaction approach. According to the policy, developers competing in a listing transaction are allowed to offer multiple times so as to adjust their price quote according to other competitors' offers. However, when observing the data, I find that though transferred by listing process, among those 103 records, the transaction price and the winner of listing of 84 records were decided on the first round. Thus the price of the majority of the listing results is the same with opening price set by the government, which reduces the competitive feature of listing and makes it less distinguished from tendering process.

5.4.4. Model Limitations

The statistical accuracy of Hedonic Pricing model is largely depended on sample size, the lager the size, the more precise the result will be. Also, this model is based on the assumption that buyers are able to purchase properties simply according to their willingness regardless of their income level, thus it fails to consider other external factors such as inflation, interest rates and the expectation of future real estate demand which also have influence on residential property price.

Moreover, the process and the result of this research is largely constrained and affected by the data integrity. The lack of data integrity is mainly due to two major reasons:

1. Incomplete and inconsistent data collection

Though the land use right transaction records have been published on the official website of Beijing Ministry of Land and Resources, the data provided is still incomplete. There were in total 523 transaction records taken place in main city area from 2003 to 2013. After removing 315 records which are still under processing, there are still 33 records whose transaction method were not provided thus cannot be used into the model. And the other 28 records are also removed due to lack of housing price data. Thus there are only 147 transaction records can be utilized by this research. However, the statistical accuracy of Hedonic pricing model is largely depended on

sample size, the lager the size, the more precise the result will be, and thus the model result is largely affected by the sample size in this research.

Moreover, the lack of collection and consistency of spatial data also influence the model result. Layers of data used as potential influential factors were defined with different projection and coordinate systems. In order to conduct calculation such as distance to Tiananmen Square, spatial data should be put under the same systems, thus errors may occur during re-projecting, redefining and readjusting.

2. Incomplete policy implementation

Besides data problems, the other main obstacle of this thesis is resulted by incomplete policy implementation. Firstly, though the Land Tendering, Auction and Listing Policy has provided three ways of land use right transferring, up till now there are only records about listing and tendering in main city area can be found on the official website. And among these records, more than 70% of the residential used land and mixed used land with residential function has been transferred by listing.

Moreover, among those transfers conducted via listing process, most of them were finished in the first round. Listing without actual bidding competition for price leads to the indifference of tendering and listing thus may also influence the accuracy of the model.

6. Discussion and Conclusion

Based on the coefficients of the equations derived from Hedonic model, land use right price is related with land parcel area, planned construction area, FAR, housing price, and distance to subway station. Housing price has the largest coefficient value thus increasing housing price leads to increasing land use right price.

The difference of land transaction price between mixed use land and residential used only land is insignificant, since up till now, the Capital Core area and Urban Function area have still been the most attractive regions for both commercial and residential investment and demands for both of these two types of land are in great demand.

Though provided as a choice of land use right transaction approaches, open auction only occurs in transfers of industrial land and residential land in outskirt area of the city. The Land Ministry still prefers listing and tendering as the main transaction methods, the reasons may be that first of all, it is more easily for the government to intervene and administrate towards urban land and residential land price, for example, the selection of the tendering winner is made by bidding committee based on the evaluation of an developer's reputation, credit, capital capability etc. thus compared with an open auction (in which the winner is the developer who offers the highest price), the bidding committee has more power on price control and process supervision. Secondly, there is not an efficient measure at this stage to avoid the occurrence of extreme high price due to the auction. Beijing land use right market once held several open auctions on residential used land in the main city area in 2007, the competitions for the land were so severe that the average auction price was at a premium of at least 120% of the original price. Thus in order to avoid making land use right market overheated, the Beijing Ministry of Land and Resources still prefers listing and tenders than auction. However, though the government intervene could help to control the unhealthy and overvalued land use right market, other concerns may occur such as the process that is lack of transparence may arouse favoritism, corruptions and irregularities.

6.1. Conclusion

The reform of land allocation policy has largely changed the real estate market and the behavior of developers, as well as the administration and management of land, which exerts influence on housing price and land use right price. According to the research, housing price is positively related with land use right price under the new policy so land use right price increases when housing price of the region is increasing. And based on the current database, there is not significant correlation between land use right transaction price and transaction modes, thus the new policy should not be blamed as the cause of overheated land market.

Compared with the previous negotiation-based land use right allocation, the Land Tendering, Auction and Listing Policy has its advantages since the negotiation-based land use right allocation not only caused monopoly on real estate market, and also behaviors such as rent-seeking and land storage. Under the negotiation-based land use right allocation policy, state-owned enterprises or developers closely related to municipal governments tend to acquire land through rent-seeking behavior and by monopolizing land resources, they finally become monopoly in real estate market. On the other hand, without breaking the principle of 'land use right transfer price should not be lower than the floor price', municipal governments allocated land to particular developers with price as low as possible so as to maximize the developers' profits and at the same time, officials in land administration sectors were also involved in the process of gaining profits from land rent. The higher the developers' revenue is, the larger the gains of those officials will be. Thus when land price is increasing due to large demand of urbanization development, developers tend to increase housing price so as to shift monetary burden to consumers, and according to the model result, this will in return, leads to the increase of land price again.

And under the new land use right transfer policy, potential competitors are provided with chances to acquire land use right through listing and tendering, which breaks the previous monopoly situation and the extensive connection between state-owned enterprises and the municipal government, and also reduces the possibility of rent-seeking behaviors. Moreover, with the regulation of 'competing on land price based on housing price roof set by the government' and 'competing on affordable housing area based on land use right price roof set by the government', developers have to be more cautious when making decisions.

However, this policy still has its drawbacks, despite of opacity problems discussed before, the other problem is that since tendering winners are selected based on their previous performance, credits etc., it reduces the opportunities of small companies and newly established enterprises. This is also supported by the data that more than 77% of the developers are large companies or state-owned enterprises. Thus the government on one hand should provide support and assistance such as finance aid or taxation incentives to encourage these companies to enter the competition so as to increase the diversity of the real estate market and also constrain monopoly. On the other hand, the standard of tendering winner selection still needs to be optimized.

6.2. Suggestions for Future Studies

The result of the research largely depends on the data and model. At this stage, this research only proves that there is correlation between housing price and land use right price but has not indicated whether there is causality relationships between them. If time, energy and data permit, other economic models such as VAR and Granger model might be utilized so as to test the causality relationship. Also, provided with housing price by land parcel under negotiation-based

allocation policy, a negotiation-based land use right transfer map could be made by GIS so as to make comparison between different land transfer policies.

References

Lei Yongtai & Li Lixin. 2007. *Study of land transfer methods impact on real estate market (Tu di chu rang fang shi dui fang di chan jia ge de ying xiang yan jiu).* China Economist (Jing ji shi), 2: 88 - 119.

Samuel P. S. Ho & George C. S. Lin. (2004). *Non-agricultural land use in post-reform China*. Cambridge Journal: the China Quarterly 179: 758 - 781.

You-tien Hsing. 2010. *The Great Urban Transformation: Politics of Land and Property in China*. Oxford University Press.

People's Republic of China Land Management Law (first adopted in 1986, amended in 1998, 2004).

Pan Shi & Dong Jingwei. 2013. *The evolution and development trend of the tendering, auction and listing policy of land use right in China (Zhong guo tu di 'zhao pai gua' zhi du bian qian xiao ying ji gai jin fang xiang).* Theoretical Investigation (Li lun tan suo) 171(2): 167 - 169.

Willkison, R.K. (1973). *Housing price and the measurement of externalities.* Economic Journal 83 (3): 72 - 86.

Yan Xing & Lin Zengjie. 1993. *Urban real estate assessment (Chegn shi di chan ping gu)*. (1 ed.). Beijing, China Renmin University Press.

Li Ruixin. 2013. *Brief summary of the influential factors on China land price assessment (Qian tan wo guo cheng shi tu di jia ge ping gu de ying xiang yin su).* Technology and Enterprise (Ke ji yu qi ye) 15: 303.

Denise, D., & William, C.W. 1996. *Urban economics and real estate markets (2nd Edition)*. Prentice Hall.

Zhou Ganghua. 2004. *Micro-factors of urban land price and its empirical analysis (Cheng shi tu di de wei guan ying xiang yin su ji qi jia ge yan jiu).* Doctoral thesis. Zhejiang University, China.

Capozza, D. R., & Helsley, R. 1989. *The fundamental of land prices and urban growth*. Journal of Urban Economics 26 (3): 295 - 306.

Hu Guanjun. 2007. *The analysis on influential factors of urban land price base on Panel Data – a case study of 27 large and middle cities in China (Ji yu Panel Data mo xing de cheng shi di jia shui ping ying xiang yin su yan jiu – yi quan guo 27 ge da zhong cheng shi wei li).* Zhejiang University, Graduation Thesis.

Ke Shanzi & He Ming. 2008. *Land price under the multi-impact of market and the government – an empirical study on Chinese cities (Shi chang he zheng fu gong tong zuo yong xia de cheng shi di jia – zhong guo cheng shi de shi zheng yan jiu).* Modern Economics Science (Dang dai jing ji ke xue) 30(2): 25 - 32.

Peng Jun & Chen Fangzheng. 2005. *Study on features about static conservation and dynamical increase of urban land price (Cheng shi tu di jia ge de jing tai shou heng yu dong tai zeng zhang te zheng yan jiu).* Journal of Tongji University (Natural Science) 33 (6): 838 - 842.

Christopher, R. Cunningham. 2005. *Housing price uncertainty, timing of development, and vacant land prices : Evidence for real options in Seattle.* Journal of Urban Economics 59 (1): 1 - 31.

Song Jianan., Jin Xiaobin et. al. 2010. *Analysis of influencing factors for urban land price and its changing trend in China in recent years (Zhong guo cheng shi di jia shui ping ji bian hua ying xiang yin su fen xi).* Acta Geographica Sinica 66 (8): 1045 - 1054.

Wang Jun. 2007. *Brief analysis of three main policies that influence land price (Qian tan ying xiang tu di jia ge de san da zheng ce xing yin su).* Management Forum (Guan li lun tan): 54 – 55.

Tang Yan. 2005. *Study on the characteristics of urban land price and its research trend (Wo guo cheng shi tu di jia ge de te dian ji qi yan jiu qu shi tan xi).* Journal of Nanjing Agricultural University (Social Sciences Edition) 5(3): 40 - 43.

Zhou Tao & Lv Ping. 2008. *Land price determination and control (Di jia jue ding yu di jia tiao kong).* China urban land investigation and dynamic monitor conference (Quan guo chegn shi tu di jia ge diao cha yu di jia dong tai jian ce xue shu yan tao hui lun wen ji).

Yang Qingyuan & Liu Zhiyong. 2000. *A study on the related mechanism of city's land price and government conduct (Cheng shi tu di jia ge yu zheng fu xing wei de xiang guan ji zhi yan jiu).* Journal of Southwest China Normal University (Natural Science) (Xi nan shi fan da xue xue bao) 25(2): 174 - 179.

Zhao Ya. 2012. *Theoretical and empirical comparison of different land transfer method : based on auction theory (Bu tong tu di chu rang fang shi de li lun he shi zheng bi jiao – ji yu pai mai li lun bing yi bei jing shi tu di shi chang wei li).* Nankai Economic Studies 4(4):97-112.

Li Mingyue & Hu Zhuzhi. 2003. *Land listing transaction – a better way than auction (Tu di gua pai chu rang: yi zhong bi pai mai geng hao de chu rang fang shi).* Production Analysis (Sheng chan li yan jiu) (1):161 - 170.

ChinaIRN. 2009. *The analysis of Beijing housing price in 2009*. Retrieved from http://www.chinairn.com/doc/70270/441601.html

Brueckner J K. 1987. *The structure of urban equilibria: a unified treatment of the Muth-Mills Model.* Handbook of Regional and Urban Economics. 2: 821 - 845